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THE CHEMOTHERAPY OF TROPICAL PROTOZOAL DISEASES*

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The important diseases caused by protozoa in tropical and sub-tropical countries are (1) Amoebiasis (dysentery in man only), (2) Haemosporidial infections (malaria and blackwater fever in man), (3) Leishmaniasis (kala-azar, in man and animals), (4) Trypanosomiasis (sleeping sickness in man and animals), (5) Piroplasmoses (tick or redwater fever in animals only), (6) Theileriasis (East Coast fever in animals only), and (7) Anaplasmosis (gall sickness in animals only). A very large number of drugs have been introduced from time to time, often in an empirical manner, for the treatment of these diseases; most of them seem to have been discarded often after lengthy clinical trials. The great difficulty, it would appear, was the carrying out of large scale clinical and field trials under properly controlled scientific conditions which would have obviated the slower accumulation of evidence of many individual workers which has often proved conflicting. The work of Ehrlich undoubtedly opened up a new field, but although rapid advances have been made specific remedies are only available for some of these diseases and we still do not understand the mode of action of any drug which has a specific effect on any particular parasite in the body. The search for new specific compounds must go on unceasingly but rational success is only possible when any particular disease can be investigated under experimental conditions. The development of suitable experimental techniques for studying the effect of drugs upon disease conditions is therefore a primary consideration of the worker in chemotherapy. It is noteworthy in this connection that in the list of diseases given above no remedies have as yet been discovered for East Coast fever and gall sickness, both of which have not yet been capable of transmission to laboratory animals. It is only possible to deal with the chemotherapy of the other diseases very briefly; amoebiasis and malaria are included for general interest although they do not come within the province of the veterinarian.

moebiasis

This is a dysenteric disease (frequently with hepatic complications) of man caused by *Entamoeba histolytica*.

The ideal amoebicidal compound must rapidly destroy the parasitic amoeba in the intestine and other tissues, should be capable of being given by the mouth, must be readily absorbed, non-irritant and non-toxic. The medicinal uses of ipecacuanha root in this light were known to the natives of Brazil in the seventeenth century, its value as an anti-dysenteric was established during the latter part of the nineteenth century, but it was not until about 1912 that the alkaloidal principle, emetine, came into use instead of infusions of the root. This was a big advance, simply because of the large quantities of the latter which were necessary for cure. Emetine hydrochloride, when given in adequate dosage intramuscularly, produces complete disappearance of all clinical symptoms in acute cases. Like most tropical disorders, established and relapsed cases are more difficult to eradicate than primary infections. As in the case of many other effective chemotherapeutic agents, emetine possesses certain disadvantages, the most notable of which is its high degree of toxicity. Numerous attempts have, therefore, been made to discover substances which, while less toxic, were as efficient as emetine. The discovery of a fluid medium in which the amoeba would grow freely has enabled the action of drugs on the parasite to be readily studied. Emetine, for example, will inhibit the growth of amoeba in cultures in a dilution of 1 : 5,000,000. Many other substances have now been made and tried out experimentally and clinically with no positive advances accomplished. A long list of arsenicals, quinoline derivatives and a heterogeneous collection of drugs as diverse as iodoform and hexylresorcinol have been included in this list. Chiniofon B.P. (iodohydroxyquinolinesulphonic acid) which has now been used extensively, although clearing up the diarrhoea, and in most cases eliminating the amoebae, has not replaced emetine because it is useless in the treatment of amoebic abscess and hepatitis. There has been no evidence to show that any of these amoebicidal drugs have an effect against other intestinal protozoa, *e.g.*, coccidia.

Malaria (Haemosporidial Infections)

There are four distinct types of protozoal parasites causing malaria in man, none of which can be transmitted to animals. In chemotherapeutic research we can, however, make great use of types of malaria in monkeys, fowls and canaries for experimental study.

* Paper presented in association with a demonstration on methods of research in the chemotherapy of tropical diseases, at a meeting of the Lancashire Division, N.V.M.A., held at Manchester on July 11th, 1941.

The properties of the cinchona bark as a cure for "ague" were known in the seventeenth century, and in 1820 Pelletier isolated from the bark two alkaloids, quinine and cinchonine; the other two, cinchonidine and quinidine, were discovered later. Quinine still ranks first in current practice on account of its cheapness, efficacy, low toxicity and the widespread knowledge of its use and dosage. Although efficient remedies are available there is still great need for more research work because each drug which has been discovered has special indications applicable to its parenteral administration, while the species, and even strain, of malarial parasite influence the response to the drug.

Quinine hydrochloride is the alkaloid of choice, although there is little to choose between the different crystalline alkaloids of cinchona in their action on benign and malignant tertian parasites. Quinine does not attack the parasite with equal virulence in all its stages of intracorpuscular development. The asexual forms are much more vulnerable while the gametocytes of *P. falciparum* (malignant tertian malaria) are not affected at all. The mode of action of the drug is not understood although it is suggested that it acts by inhibiting reproduction and retarding the asexual cycle. In addition to its pronounced therapeutic action, quinine possesses the advantage in that if taken regularly in daily dose by the mouth, useful prophylactic results can be obtained during the malarial transmission season and during temporary stays in the tropics.

For various reasons (but probably beginning because of the shortage of quinine during the Great War), many attempts have been made to find stronger and better substitutes for quinine. Before 1926, apart from the arsenicals the only compound known to have antimalarial action was methylene blue. Schuleman on this basis prepared a large number of methylene blue derivatives and, by using avian malaria as the experimental infection, finally discovered a compound now known as pamaquin B.P. It is of interest to note that, although originally derived from methylene blue, the constitutional formula has analogies to quinine. This drug has a therapeutic index of 1 : 33 as compared with 1 : 4 for quinine in bird malaria and is particularly effective in human malarial infections due to the benign and quartan parasites in a daily dose of about 0·01 to 0·03 gm. In the case of malignant tertian fever, it has no action at all upon the asexual or schizogony cycle and the parasites multiply unchecked, but it possesses the unique property of completely destroying the gametocytes. Combined with quinine, therefore, this type of malaria can be controlled. This drug also, unfortunately, has a high degree of toxicity, not the least alarming toxic symptom being cyanosis.

This discovery marked the inauguration of the use of synthetic anti-malarials but the limitation of activity and the toxic dangers indicated that further research was necessary. Many homologues of pamaquin B.P. were prepared and tested and eventually mepacrin hydrochloride B.P. was discovered. This drug possesses a similar action to that of quinine in controlling and destroying the asexual or schizogony stage, but it has no gametocidal action. Many other compounds have been tested as antimalarials, but at present the three drugs mentioned are those about which there is sufficient experimental and clinical evidence to show that either alone, in certain types of infection, or combined in others, they can effectively control the incidence of this major tropical disease. Still better and more effective drugs are required and the search for the ideal antimalarial is being actively pursued.

Leishmaniasis

In man three distinct diseases are included in this group, *viz.* (1) Kala-azar (visceral leishmaniasis), (2) Oriental sore (cutaneous disease), and (3) Espundia (nasopharyngeal disease, confined to S. America). Although clinically distinct and having a different geographical distribution, they appear to be associated with what appears to be the same organism (Leishmania). A visceral and cutaneous form also occurs in the dog and there is good reason for believing that the former is identical with human kala-azar. The main features of the kala-azar (human and canine) are a chronic course, irregular fever, progressive anaemia and emaciation, and enlargement of the spleen. The cutaneous and nasopharyngeal forms in man and the dog are characterised by local chronic ulcerations.

The use of antimony in the treatment of the visceral type of disease (kala-azar) was probably one of the most important chemotherapeutic advances of the present century. Previous to this the death-rate from kala-azar in India was about 90 per cent. The reason why antimony, alone among the elements, possesses this specific action is as yet unexplained. Tartar emetic was first used in the S. American disease by Vianna (1912) to be quickly followed by confirmation of its effectiveness in kala-azar in India and elsewhere. As toxic effects occasionally followed the use of potassium antimonyl tartrate, this drug was largely replaced by the less toxic quinquevalent preparations of organic compounds which fulfil the requirements of reduced toxicity to the host and increased toxicity to the parasite. The list of the number of these compounds now prepared is a long one. The use of the hamster (which is susceptible to leishmanial infection) as an experimental animal, undoubtedly helped in the researches concerning the chemotherapy of these antimonial preparations. Their clinical use in man has given highly successful results and in the hands of some workers the mortality has been reduced to about 5 per cent. The mode of action of these drugs is unknown; *in vivo* and *in vitro* experiments suggest that it is not a direct one but may be through stimulation of the reticulo-endothelial system to the production of parasiticidal substances. In both Oriental sore and muco-cutaneous leishmaniasis treatment is not so successful, one great difficulty to overcome being that the former is a benign lesion which will heal spontaneously in time. Many favourable reports on the use of antimony have, however, been published, although it is certain that the mucocutaneous forms of S. American leishmaniasis are much more resistant to antimony. The quinquevalent antimony compounds have proved valueless for this form, although effective for kala-azar.

The most modern advances in connection with the therapy of leishmaniasis concern the discoveries of Warrington Yorke, King *et al.*, regarding the action of compounds of the diamidine series. Experimental work and preliminary clinical trials indicate that a fresh field has been opened and that some of these

diamidines may prove to be some of the most powerful drugs yet discovered which are lethal not only to the leishmania parasite but to some of the trypanosomes and piroplasms.

The treatment of the canine condition has followed closely after various developments of the human disease and with successful results, and it appears that any drug effective in the case of human kala-azar proves equally so in the dog.

Trypanosomiasis (Sleeping Sickness)

The adequate control of this disease constitutes one of the major problems for both the medical and veterinary worker in the tropics. It also occupies a particular position for the worker in chemotherapy, mainly because of the large number of species of trypanosomes which are known to be pathogenic for man and animals which do not necessarily respond to the same trypanocidal drug. The qualities of a specific compound for any particular form of sleeping sickness have to be considered separately according as to whether it is for use in man or animals; not the least quality when for veterinary use being the economic one of cheapness. On the experimental side we are fortunate in being able to use mice as experimental animals in which the testing of trypanocidal compounds can be made on a large scale.

The consideration of the treatment of trypanosomiasis had no "traditional elixir" dating back to early times (such as was the case with malaria and amoebiasis) as a background on which to base further scientific work. As soon, therefore, as the causal trypanosomes were discovered treatment largely followed along empirical grounds. Drugs apparently picked at random, such as iodine preparations, perchloride of mercury, etc., were used initially without success. Both Lingard and Bruce, however, shortly after the latter made his discovery of *T. brucei*, used arsenicals for surra in India with remarkable results.

Later, the work of Ehrlich and his pupils showed that trypanocidal action was a property possessed by a wide variety of chemical substances both metallic and non-metallic, having no obvious chemical or physical properties in common. These included basic dyes such as parafuchsin, methyl violet, pyronin; azo dyes such as trypan red, trypan blue; certain organic compounds of arsenic, and some antimony preparations. An enormous literature is now in existence dealing with chemical and biological work on trypanocidal agents, but in spite of this the number of compounds actually in use for the treatment of sleeping sickness is comparatively small: tryparsamide and orsanine among the quinquevalent arsenicals suramin B.P. (naganol or antrypol) and certain antimonial preparations almost exhaust the list. Suramin is valueless in cases where the nervous system is involved and the discovery of the diamidines, although a great advance and showing immense future promise, is too recent to have allowed the making of extensive controlled clinical trials. From the point of view of the veterinarian the position is even more unsatisfactory and must be considered entirely apart from that of the human angle. Drugs which are active against the human disease have been found to be remarkably inert in certain forms (not all) of animal trypanosomiasis. Chemotherapy undoubtedly has not as yet provided the answer to the questions of disease control and to a large extent the drugs in common veterinary use in Africa are regarded as a palliative of an evil which is constantly before the veterinarian. There is thus a great need for intensive research in the chemotherapy of trypanosomiasis of both man and animals, while for Chaga's disease (caused by *T. cruzi* and occurring in S. America) no drug has as yet been found with any certain curative action.

The more important trypanocidal compounds which have been developed and used may be listed as follows:—

A. Metal-containing Compounds

1. Arsenical Preparations

(*a*) *Tryparsamide* (Sodium-N-phenylglycinamide-p-arsonate). This drug has been mainly used for human cases due to *T. rhodesiense* and *T. gambiense*; its value seems to lie in the ease with which it penetrates the central nervous system. It has had little or no application in veterinary work.

(*b*) *Fourneau 70 or Orsanine* (Sodium-4-acetylamino-2-hydroxyphenylarsonate). This drug has been used extensively in French equatorial Africa, where it has partially replaced tryparsamide and where it has been claimed to be superior to the action of the latter.

(*c*) *Neocryl* (Sodium succinanilomethylamide-p-arsonate). This compound was made in an attempt to combine the desirable features of acetyl-p-arsanilic acid and tryparsamide and has been found to give promising results in Nigerian sleeping sickness of man.

(*d*) *Diarsonic acids.* It has long been known that *T. congolense* infections of animals constitute probably the most serious of animal types of sleeping sickness in Africa, particularly in regard to treatment. The infections fail to react to the quinquevalent arsenicals which readily cure other types of trypanosomiasis, at least in the small laboratory animals. This is upheld by field experiences which indicate that antimonial preparations must be used for *T. congolense* infections and arsenicals for *T. brucei*. The claims remain conflicting and tartar emetic injections, although used extensively, at the best have proved merely a palliative, but not very effective, means of control. Claims have been made that compounds of this series have a special action in *T. congolense* infections, but these await the support of suitable clinical trials.

2. Antimonial Preparations

Until recently antimony compounds were almost the only ones used in the treatment of trypanosomiasis of animals although numerous attempts have been made to introduce them for the treatment of the human disease. Intravenous injections of tartar emetic are still widely used for veterinary work in the African colonies even although the dose required for cure approaches closely to the toxic level and it needs to be given by experienced workers. The dangers associated with tartar emetic administration no doubt led to the attempts to discover better antimony preparations. Again field tests have not been made on a sufficiently large scale to support experimental results.

Non-metallic Preparations

1. Suramin B.P.

Introduced in 1920, sufficient time has now elapsed to indicate that it is a drug of the greatest value in the early stages of trypanosomiasis of man and certain types of the disease in animals but before the central nervous system is attacked. Thereafter it is of little value. Toxic reactions are remarkably few and providing the drug is given in the

first few weeks there is a reasonable chance of cure in both *T. rhodesiense* and *gambiense* infections of man. Its value has now also been proved for nagana (caused by *T. brucei*) and surra (caused by *T. evansi*) of animals, although it possesses the disadvantage that it cannot be given subcutaneously.

2. A Number of Quinoline, Acridine and Guanidine Derivatives have also been prepared in recent years, some with signs of promise in the experimental stages which were not subsequently confirmed clinically. The most modern advances concern the discovery of the trypanocidal activity of the diamidines by Warrington Yorke and his colleagues.

The complex question of chemotherapy cannot adequately be dealt with in such a summarised form, but whatever drug is discovered a very important bearing on the question of prophylaxis concerns the unexplained development of drug resistance. After repeated administration, or sometimes even after a single dose, most compounds so far discovered, unless immediately lethal to all trypanosomes in an infected case, may render the parasites resistant to further action of the drug.

This resistance may persist for years and may be retained by the parasite after passage through the tsetse fly. This is a factor of great practical importance because, as a result of insufficient treatment, strains of drug resistant parasites have undoubtedly been produced in man and animals.

Piroplasmoses

Piroplasmoses comprise a group of diseases, usually running an acute course, caused by Piroplasma (Babesia and Theileria) and transmitted by ticks. The principal symptoms are anaemia, haemoglobinuria and icterus. The diseases (because there appear to be distinct types for each domestic animal) constitute an important problem for the veterinarian in the tropics, America, Australia and also in some parts of England. In many parts of Africa all indigenous stock acquire infection early in life and may remain carriers.

Nuttall (1909) first drew attention to the therapeutic activity of trypan blue in Babesia infections and since then there have been many attempts to find a more efficient remedy. In some colonies the dye still remains the drug of choice. Apart from the discovery of Stephan and Estibel (1929) that acriflavine also exerted a definite action on certain Babesia infections there seems to have been no real advance in the therapy of this important group of diseases until 1935. Kikuth and others then published accounts of very successful results obtained with a product 6 : 6′ (di-N-methyl quinolinium methosulphate) urea. As it is a colourless urea compound it possesses an advantage over trypan blue in that it does not stain the tissues of treated animals. It is administered subcutaneously, or intramuscularly, in doses of about 1 c.c. of a 5 per cent. solution per 100 lb. bodyweight. It has been claimed to be equally effective against all Babesia infections. Sufficient clinical trials have now been carried out by veterinarians in the African colonies and elsewhere to show that this drug is a remarkably specific remedy.

A Ministry of Agriculture official stated recently that between 2,000 and 2,500 farmers in England and Wales, farming probably as much as 150,000 acres, have been turned off their land for inefficiency, since the "Grow more food" campaign began.

THE VETERINARY RECORD
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THE FUTURE OF VETERINARY EDUCATION

Without an accurate acquaintance with the visible and tangible properties of things our conceptions must be erroneous, our inferences fallacious, and our operations unsuccessful. "The education of the senses neglected, all after-education partakes of a drowsiness, a haziness, an insufficiency, which it is impossible to cure." Indeed if we consider it, we shall find that exhaustive observation is an element in all great success. (From Herbert Spencer's Essay on Education.)

A FEATURE of this war and one which augurs well for the future is the amount of serious thought which is being given to post-war planning. The Cabinet has appointed a special minister for the purpose, the British Association has recently been devoting its whole attention to the subject and the British Medical Association has appointed the Medical Planning Commission. One can only hope that as the field of scientific endeavour is gradually increased to include such objects as the social and economic organisation of mankind, this planning will become more and more scientific and hence ever more successful. In one important field, namely that of nutrition, there is already sufficient scientific knowledge to lift this subject largely above the level of political debate.

The key to all medical planning is, of course, medical education and a perusal of current medical journals shows the great amount of thought which is being given to this subject. It is the custom both of *The British Medical Journal* and *The Lancet* to publish an annual education number. This year (issues of September 6th and August 30th respectively) they are restricted in scope but contain some very valuable articles which show how similar, in many ways, are the problems of medical and veterinary education.

In these education numbers Professor Ryle, Mr. Donald McDonald (President of the British Medical Students' Association) and writers of leading articles all agree that a better integration and orientation of subjects are required and that the gap between preclinical and clinical studies needs to be bridged. Although two years are already spent studying physiology it is felt that an even better understanding of this key subject is required. A fuller knowledge of preventive medicine and a greater practical training in the everyday emergencies of clinical practice are very necessary. Professor Ryle is particularly insistent that there is too much lecturing and instruction and too little education in its truer and better sense: "the student must be encouraged to observe naturally occurring phenomena" and the

demonstration lecture is a valuable way of doing this. He believes that much freer and more democratic discussions should take place between students and teachers, that student societies should be more active during war than in peace and that their views on education should be given serious consideration. It is therefore interesting to note that the British Medical Students' Association has been asked to submit a report to the Medical Planning Commission and that the proceedings of the first Conference of Veterinary Students have just been published (*Veterinary Record*, September 13th). The restraint, judgment and apparent knowledge of professional affairs displayed in the report of these proceedings must have surprised many of our readers and it is to be hoped that the views of our own students will be treated with the same consideration as those of medical students.

The Survey Scheme has already had a great educational value both inside and outside the profession but so far it only envisages a short-term policy and it is clear that it can only succeed as part of a comprehensive long-term plan. One thing which has emerged from the enquiries being made by the Survey Committee is that much more scientific investigation is necessary to evolve more effective methods of disease control among farmstock. It is also clear that veterinary education is the key to any long-term policy for the control of disease because it must be apparent to all that money spent on research institutes or on schemes for the promotion of animal health will be largely wasted unless there are men available who have received the necessary training and, above all, who have been inspired with the highest ideals during their student days.

By far the most effective means of accomplishing these two aims of increasing scientific knowledge and teaching students must be the provision of greatly increased facilities for research in all branches of veterinary science *at the veterinary colleges*: this will automatically provide better facilities for teaching.

A leading article in *The Lancet* (August 30th) contains the following passage: "it is not our duty . . . to give praise or blame, to bring any of the agents to judgment, but rather to find out by patient enquiry how the pre-war curriculum came to be the poor frustrated thing it was and to share in the glorious task . . . of infusing new life into the old framework. It is time to make changes." Few would claim that the veterinary curriculum has been better than the medical and it appears that our problems need to be approached in exactly this spirit. Therefore, although Trotter has said that really effective thinking is one of the most difficult of all human activities and one very easily inhibited by professional and official conventionalities, we would urge that a great deal of really effective thinking about veterinary education needs to be done and done now.

If we ourselves can evolve no effective plan for veterinary education or for the efficient organisation of the profession there is no doubt that it will be imposed by some outside authority. The Loveday Report was emphatic that drastic reorganisation of veterinary education is required. Far less attention must be paid to the horse and the dog, particularly their anatomy and surgery, and far more attention must be paid to preventive medicine, the reproductive diseases, applied veterinary physiology and animal husbandry of the food animals. A two-years' course in veterinary physiology should, if well taught, lead naturally to the course in animal husbandry and the two together would train the student to "observe natural phenomena" in the domestic animals.

It is obvious that greatly increased facilities for research in all subjects will be required at the colleges to attract men of the highest ability as teachers.

We are glad to know that the Council of the Royal College of Veterinary Surgeons has again turned its attention to the veterinary curriculum and that members of the "syllabus committee," which includes all the Council, are now asked to submit, by an early date, their considered views upon the main principles which should govern the framing of such a curriculum. It is to be hoped that the Council will "effect a thorough reconstruction of our curriculum, simplifying, condensing and pruning, eliminating all the venerable accumulations, the merely traditional and sentimental moieties, the intellectual vested interests" and that "by exercising the most stringent selection and balancing subjects throughout with a more luminous vision and a more prophetic imagination" they will evolve a system of education worthy of the tasks we have to perform and of the post-war world which we hope will be built out of the present struggle.

Weekly Wisdom

Perhaps the only satisfactory way (to improve the teaching of biology) is to effect a thorough reconstruction of our curriculum, simplifying, condensing, and pruning, eliminating all the venerable accumulations, the merely traditional and sentimental moieties, the moribund and dead matter, the intellectual vested interests, the fetishes and shibboleths, exercising the most stringent selection and balancing them throughout with a luminous vision and a more prophetic imagination.—Nature, 1941. **147**. 427.

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MORE HORSES

In reference to the restoration of the grants for heavy horse breeding, "Blythe" writes as follows in a recent issue of *The Farmer and Stockbreeder*: "It is undoubtedly right that encouragement should again be given to farm horse breeding. With farms of all sizes, the majority of them small, we are never likely to be completely mechanised any more than we are likely to turn completely from permanent to rotational grass. Horses and tractors, permanent pasture and temporary leys are complementary. Where a farmer ran raise a team of three good horses to cut about one acre per hour, and can hire a tractor for ploughing while his horses deal with the harrowing and drilling, would he be greatly advantaged by possessing a tractor for his own exclusive use?"

ABSTRACTS

[THE DETERMINATION AND CLINICAL CORRELATION OF VARIATIONS IN THE CALCIUM, INORGANIC PHOSPHORUS AND SERUM PROTEINS OF HORSE BLOOD. Craige, A. H., and Gadd, J. G. (1941.) *Amer. J. Vet. Res.* **2**. 227.]

The data on which the conclusions of this paper are based were obtained from the analysis of blood samples from over 300 horses. The object of the work was to ascertain if there was any correlation between bone weakness and deficiency of calcium and phosphorus in the blood. It was found with regard to the calcium content of the blood that variations within the normal range (11 to 13·5 mg. per 100 ml.) could be related to seasonal change and the differences in the feeding, but no influence could be ascribed to age and sex ; the age of the horse, however, appeared to be the most important factor in determining the blood level of inorganic phosphorus. In the case of total serum proteins, the normal range was found to be 5 to 7 gm. per 100 ml., averaging 6·1 gm. Age, seasonal change and pregnancy induced deviations within this range. The albumin : globulin ratio was also determined and it was ascertained that variations in total protein were due largely to changes in the globulin fraction.

Since it has been suggested that variation in calcium and phosphorus are to a significant extent the result of interaction amongst calcium, phosphorus and protein, the authors propose the following equation as a means of correlating the three analyses and thus of showing primary disturbance in the blood calcium and phosphorus.

$$Ca^{++} + 0{\cdot}4\ P - C_{age} = Fv$$

In this equation Ca^{++} and phosphorus are expressed as milligrams per 100 ml. of serum ; C_{age} is a constant varying with the age of the horse and which can be found from Table IV in the paper, and Fv, the result, is normally zero, with a standard deviation of 0·3. Ca^{++} is estimated from the figures for total Ca and protein according to the formula of McLean and Hastings (*Amer. J. Med. Res.* 189. p.601).

[This equation has been used by the authors to study cases of acute, subacute and chronic bone lesions as well as diseases of the soft tissues. The results and conclusions should prove of interest to all workers on the subject but it should be remembered that the relatively wide ranges of normal variation observed in serum, calcium and inorganic phosphorus overlap the findings reported for cases of recognised abnormality, and though the authors claim to have obviated this difficulty by means of their equation a much greater number of cases of disease would have to be critically examined.

In the introduction a short review and bibliography are given of most of the recent work on the chemical composition of the blood of the horse. This in itself is valuable to those interested in the biochemical aspects of animal diseases.—*Abstractor.*] J. S.

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[STUDIES ON CONTROL OF THE LIVER FLUKE OF CATTLE IN THE HAWAIIAN ISLANDS. Alicata, J. E. (1941.) *Amer. J. Vet. Res.* **2**. 152-164]

Liver fluke infection by *Fasciola gigantica* represents one of the major diseases of cattle in the Hawaiian Islands, where it has been roughly estimated that 50 per cent. of beef and 80 per cent. of dairy cattle are infected. Maintenance of the widespread fluke infection is largely dependent on topography, climatic conditions and agricultural practices, the poorly drained lowlands and mild climate making the region suitable for snail propagation the year round and for the development and hatching of fluke eggs and for an increase in the longevity of the cysts on vegetation. Also, many dairymen have for long habitually fed infective forage, cut from wet and swampy areas, to cattle. Fluke control methods being advocated are similar to those practised elsewhere and involve the control of the fresh-water snail intermediate host, *Fossaria ollula*, by broadcasting copper sulphate in streams and swamps at the rate of 1 part of the salt to 300,000 parts of water. Alicata advocates the use of carnivorous larvae of fireflies which use fresh-water snails and other invertebrates as food. These insects (*Luciola* spp.), introduced from Japan and the Philippines into the Islands, are being reared and liberated in suitable localities in the hope that they will become established. To protect animals from infection, infected areas are fenced off and vegetation cut from these regions debarred as fodder. Alicata has suggested ensilage as a possible means of destroying encysted cercariae on vegetation. The destruction of flukes in cattle by using anthelmintics has been investigated and Distol, at the rate of 1 capsule per 70 lb. body weight, the total amount being divided into approximately equal doses and administered over two successive days, has been found highly effective and is well tolerated by animals. Kamala, administered as 1 capsule (10 gm.) per 60 lb. body weight over a 4-day period, was also effective but caused extensive diarrhoea and loss of appetite for a few days to about two weeks. Hexachloroethane also destroyed flukes but caused colic when given in high concentrations ; it was, however, well tolerated and highly effective when mixed with Kamala extract and given as 1 capsule (10 gm.) hexachloroethane with 1·75 gm. Kamala extract per 70 lb. body weight over two successive days. Most animals treated with all these drugs improved in general physical condition although a few lactating cows showed slight decrease in milk production, following treatment, for one to two weeks. A counting technique combining sieving and repeated sedimentations was devised to determine the fluke egg output per gramme of faeces and to estimate the relative efficiency of the various drugs. From additional studies, Alicata found 1·013 to be the average number of eggs per gramme of faeces per adult fluke : using this it was possible to estimate the approximate number of flukes in an infected animal from egg counts.

J. N. O.

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[ANTIBODY FORMATION IN A TUBERCULOUS LESION AT THE SITE OF INOCULATION. Westwater, J. O. (1940.) *J. Exp. Med.* **71**. 455-467. (7 tables, 15 refs.).]

Evidence is presented to show that antibody is formed in the skin at the site of injection of tubercle bacilli. Male albino rabbits were used as experimental animals. The Ravenel bovine strain of tubercle bacilli suspended in paraffin oil was injected intradermally. Following simultaneous administration of 0·2 mg., 0·1 mg., and 0·05 mg. of killed bacilli

in 0·2 c.c. of paraffin oil in each animal, complement-fixing antibody appeared in the serum. The rate of appearance varied widely in individuals and the highest titre recorded in the nine weeks covered by the experiment was 1 : 40. In extracts of tissue from the site of inoculation, however, complement-fixing antibody was detected by the seventh day in most cases. All gave positive results by the eleventh day. There was considerable variation in titre from week to week. The highest recorded was 1 : 80 on the 21st day.

In general, it was found that the antibody appeared earlier in the lesion at the injection site than in the serum, and existed in higher concentrations for about three weeks. After this period, however, the serum often showed the higher titre. Reinjection of killed bacilli into the experimental animals did not stimulate the production of antibody in the local lesion any earlier than in normal animals similarly injected.

D. D. O.

IN PARLIAMENT

The following are among the questions and answers recently recorded in the House of Commons:—

AGRICULTURE: LONG-TERM POLICY

Brigadier-General BROWN asked the Minister of Agriculture whether any action is being taken by the Government to carry out an agricultural long-range policy, as recommended in the Sixth Report of the Select Committee on National Expenditure; and whether he will take steps now to consult the Agricultural Council of England and Wales and other bodies interested in agriculture on this matter?

Mr. HUDSON: The broad principles of a permanent post-war policy for agriculture are under active consideration. I am not yet in a position to enter into consultations with the various bodies interested in this subject, but it is my intention to do so in due course.

Brigadier-General BROWN: Is the Minister aware that plans have to be made years ahead and that land will not go on producing corn unless there is a long-term policy? If farmers are to have confidence in my right hon. Friend and in the Government surely the time has come when more details of a permanent agricultural policy should be outlined?

Mr. HUDSON: I am perfectly aware of the need for a long-term policy, and that is why I have told county war agricultural committees that they can now consider the harvest for 1945.

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LIVESTOCK (EXPORTS)

Colonel CARVER asked the President of the Board of Trade whether there have been any conferences under the auspices of his Department between the breeders of pedigree cattle and his export committees; and what steps are being planned?

Captain WATERHOUSE: By arrangement with the Business Members Committee of the Industrial and Export Council, livestock exporters and representatives of some breed societies were invited to a meeting at the Board of Trade on September 29th to consider proposals for the formation of an Export Group. The meeting was well attended and an Export Group was formed. The Chairman and Secretary provisionally appointed were Mr. Nevill Matthews, of John Thornton, Hobson and Company, and Mr. F. J. Bull, Secretary to the British Dairy Farmers' Association, and the address of the Group is 28, Russell Square, W.C.1. Like other Export Groups, it will advise the Industrial and Export Council about all problems affecting the trade and will, in particular, assist in the arrangements for passing stock through the quarantine station recently opened by the Ministry of Agriculture.

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HORSEFLESH

Mr. EVELYN WALKDEN asked the Parliamentary Secretary to the Ministry of Food whether he is aware that, since the Order No. 1492, which fixes the price of raw meat for dogs, cats and other domestic animals at 8d. per lb., became effective, such meat is almost unobtainable; that a number of retail shops, known as Pussy's Butchers or Bonzo's Butchers, have ceased to deal in meat or food for animals and have transformed their business to sell horseflesh for human consumption only at prices up to 1s. 4d. per lb.; and whether he can now make a statement or issue a further order governing the price and sale of this class of meat?

Major LLOYD GEORGE: I would refer my hon. Friend to the reply I gave on October 15th to the hon. Member for Twickenham (Mr. Keeling). I understand that meat for feeding animals is on sale in many areas within the maximum prices prescribed in the Order.

Mr. WALKDEN: Does my right hon. and gallant Friend recognise that this particular sale of horseflesh is the biggest ramp that is in existence at the present time and is the worst black market that we have operating by the same people who are running other black markets?

Major LLOYD GEORGE: If my hon. Friend will look at the answer that I gave last week, he will see that I said that steps are being taken now to control these sales.

Mr. WALKDEN: Does the Minister recognise the urgency of the action indicated in the Question?

Major LLOYD GEORGE: Certainly.

READING MATTER FOR TROOPS IN ICELAND

We were glad to publish in our issue of September 20th an appeal from Capt. G. K. Shaw (Major, R.A.V.C. (ret.)) of the Pioneer Corps, Iceland (C) Force, for books and other reading material for men of his company. A correspondent who has responded forwards us a letter of appreciative acknowledgment from Capt. Shaw, in order that maintenance of interest may be ensured and further parcels sent. "All the men are very grateful," writes Capt. Shaw, and adds: "I hope to get a decent library going this winter, and that along with lectures and educational classes of various kinds should help things considerably." There is still time for readers thus to assist the men in passing the Arctic winter.

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RUSSIAN CAVALRY EXPANSION

The Stockholm Correspondent of *The Times*, in a message to his paper published on Monday last, observes: "In connection with Marshal Budyonny's new appointment, his task (of preparing the Russian reserves, in conjunction with Marshal Voroshilov) is believed to be associated with the expansion of the Russian cavalry for intricate winter operations. It is expected here that the war will offer the unique spectacle of large-scale operations of Russian cavalry against the ski troops of the Axis in regions where snowdrifts will prevent the use of other mobile troops. According to the latest published information from the Russian side, the Red Army has approximately 40 cavalry divisions, of which only three have been in action so far. The cavalry is also expected to penetrate deeply into the rear of the Axis forces for independent action and in order to reinforce the existing guerillas."

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Medals for proficiency in cattle pathology gained by students at the Royal Veterinary College have been awarded by the Royal Agricultural Society to Messrs. H. Lall (silver medal) and J. J. R. Hindle (bronze medal).

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Nov. 4th.—Meeting of the Consultative Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 11.15 a.m.

Nov. 4th.—Combined meeting of the Finance and General Purposes Committee and the Organising Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 2 p.m.

Nov. 6th.—Meeting of the Derbyshire Division, N.V.M.A., at Sutton Bonington, 2 p.m.

Nov. 7th.—Annual Meeting of the North Wales Division, N.V.M.A., at Bangor, 11.30 a.m.

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Refresher Tuition in Pregnancy Diagnosis and the Treatment for Infertility in Bovines

It would appear that there has been some misconception concerning the arrangements which have been made for the benefit of members in connection with the above.

Tuition is free but practitioners desiring this will be expected to provide facilities for it to be carried out in the herds of their own clients, and they should endeavour to make arrangements for preliminary tuition to take place at a local knackery, ensuring the provision of specimens of bovine uteri.

It is anticipated that tuition will generally last one or two days, although visiting "specialists" will spend some time in each area. In order to avoid wasting time and unnecessary journeys it is requested that any members who desire tuition and have not yet sent their names to the General Secretary, 10, Bore Street, Lichfield, Staffs, will do so without delay, as the work will begin in the immediate future.

It is hoped that the above information will answer satisfactorily the many queries in connection with this subject which the General Secretary has received from members during the past ten days. Practitioners who have already sent in their names and those responding to this reminder will be notified shortly of arrangements made for the visit of an instructor to their area.

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A.R.P. (Animals) Service

Arrangements have now been made with the Ministry of Home Security for the issue of Certificates of Occupation to members of the profession who are assisting the A.R.P. (Animals) Service, in order to facilitate their passage in controlled areas.

The form is a certificate of occupation issued under the authority of the Ministry of Home Security through the N.V.M.A. Members of the profession who desire such a certificate should make a request—giving their National Registration Identity Number and intimating whether they are engaged in general practice on their own account or, if employed by others, in what capacity—and forward it to 36, Gordon Square, W.C.1, marking the envelope "A.R.P."

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PERSONAL

Birth.—Mather.—On October 12th, to Dorothy, wife of A. Mather, M.R.C.V.S., at Torrington, a daughter.

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R.C.V.S. OBITUARY

The Late Mr. W. H. Dennett, M.R.C.V.S.

Mr. William Henry Dennett, whose death we recorded with much regret in our last issue, will be greatly missed in Fakenham and a wide area of north Norfolk, for not only were his professional services valued highly, but the range of his interests was wide and he entered into the life of the community in many useful ways.

Mr. Dennett went to Fakenham about 18 years ago, and it was not long before he was elected to an office with the Conservative Association. For several years he was a leader of the Conservative Party locally in his capacity as Chairman of the Fakenham branch of their association for the North Norfolk constituency. Fakenham cricket had in Mr. Dennett an enthusiastic supporter. Until a few years ago an annual tour was made in Nottinghamshire by the North Norfolk Nomads and Mr. Dennett used to accompany the Nomads on those enjoyable tours.

The agricultural industry of the district was fully represented in the large congregation at the funeral service at Fakenham Parish Church on Sunday, October 12th, and there were also present, in addition to many friends, representatives of Fakenham and District Cricket Club and Fakenham branch of the North Norfolk National and Conservative Association, while a guard of honour was formed by members of the Joppa (Fakenham) Lodge of Freemasons before and after the service, which was attended by the following members of the profession: Messrs. H. P. Standley, jun. (Norwich)—representing the Eastern Counties Division, N.V.M.A.—P. D. Thomson (Watton), H. C. Swann (King's Lynn), N. F. Pollock (West Runton), S. E. Hill (East Rudham), D. C. Harries (Fakenham), and B. A. Claxton (Norwich).

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MISS CUST VETERINARY RESEARCH SCHOLARSHIP

In the report of the October meeting of Council, R.C.V.S., which will be published in the next supplement to *The Veterinary Record*, it is recorded that the award of the Miss Aleen Cust Veterinary Research Scholarship for the session 1941-42 has been made to Mr. J. H. Laing, M.R.C.V.S., B.Sc., his place of research to be the University of Cambridge, under Dr. Walton.

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Under the auspices of the London County Council, a course of four lectures and demonstrations on "Gas-contaminated Food" will be given by W. R. Wooldridge, M.Sc., Ph.D., M.R.C.V.S., at the Smithfield Institute, Eagle Court, St. John's Lane, E.C.1, on Wednesdays commencing November 26th, 1941: lecture 2 to 3 p.m.; demonstration 3 to 3.30 p.m.

Those who wish to attend are requested to apply to the Secretary at the Institute, remitting the fee of 6s. 8d., as soon as possible, in order that the requisite enrolment card may be forwarded and returned, thus enabling accommodation to be reserved.

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THE FUTURE OF MEDICAL EDUCATION

A Medical Student's View

To the educational number of *The British Medical Journal* (September 6th, 1941) Mr. Donald McDonald, of Radcliffe Infirmary, Oxford, President of the British Medical Students' Association, contributes the following article, which will be of interest to our readers, inasmuch as the veterinary profession at this time is presented with closely parallel problems.

To say that medicine and the medical profession need reforming is to-day to utter a commonplace. To decide how this shall be done is less easy. In the past the wider problems of medicine have been the hobby of more or less eminent members of the profession who are retired. To-day, sudden and violent change has become such a part of our daily life that everyone takes note, and the future has become the vital concern of everyone. As a sign of this, meetings of medical students from schools all over Britain, which were unknown ten years ago and embryonic four years ago, this year gathered almost 200 students at Cambridge, organised as the British Medical

Students' Association. They discussed problems in every sphere of medicine; but, because the student of to-day is the doctor who will have to solve these problems to-morrow, and because the education he receives will make or mar his success in this task, medical education was held to be the most important link in the chain of medical planning.

The first and yet most vital problem is the actual entry into the medical school. For the individual who wants to be a doctor this is a question of money rather than ability. For the community, it determines very largely what sort of a doctor it will get; for, as one Spanish university has it, "What Nature has denied, Salamanca cannot supply." No one can doubt that the present methods of selecting medical students are haphazard in the extreme. A father's sentimentality; a desire for a safe job; almost any reason, except a desire to serve the community, is good enough, provided there is enough money for the initial heavy expenditure. Medical schools, bound up with the voluntary hospitals, have to accept such students as a source of income, using a very few scholarships as a means of advertising. The solution clearly must lie with the provision of a vastly increased number of scholarships by the State. Only then can students be chosen because they will make good doctors, which requires temperamental as well as intellectual qualities, and not for any other reason.

The Curriculum

The medical curriculum itself is long and arduous. This is inevitable because the subject is vast and the doctor needs to be efficient in every branch of it; therefore no one complains about its length. On the other hand, there is much that is useless and irrelevant which needs to be pruned away. The result of this will not be to shorten the whole course but to allow more important subjects to be introduced. The war-time need of getting doctors as quickly as possible introduces an important factor into immediate considerations of the question, but will not alter the long-term view of what is felt to be desirable. In chronological order, the pre-medical course in the elements of the physical and biological sciences comes first. It needs drastic revision, for it is poorly presented, uninformative, and a dead-weight on the early enthusiasm of the student. Although its aims are entirely praiseworthy it is still planned, as in olden times, for the student who read only classics at school, and even possibly took a classical degree before proceeding to medicine. To-day that is true of very few, and certainly specialisation at school should not be so advanced as to exclude anyone's reaching university standard from the elementary knowledge of physics and chemistry that is required. In the meantime, the university teaching in these subjects could be much more imaginatively related to their application in medicine. On the other hand, students who have reached Higher Certificate standard in these subjects at school should not be forced to relearn them, as they are at many universities. With regard to biology the position is different. A sound understanding of the behaviour of living organisms in general is essential for the doctor, but the manner of presenting the subject is not the best. Botany is still based on the needs of the doctor who dealt directly with medicinal herbs. Zoology is planned on the Huxleian idea that evolution was in a single line and that a study of lower types will lead directly to an understanding of man. In practice this has led to the student's being required to know details of animals which are the failures, the dead-ends, of evolution. Man is the simplest mammalian type, and is easier to understand than other species which are highly specialised in one direction. Therefore the comparative anatomy learnt at this stage is actually much better introduced with human anatomy. A course in General Biology orientated to the special viewpoint of the doctor is required, and this should include the principles of heredity; the evolution of behaviour, which is necessary for an understanding of psychology; and also oecology—the study of animal communities—leading on to sociology. In recognition of the fundamental importance of this course it should be taught by the best and most mature teachers. A course of this type is given in America, and is found to be very successful. Some people go further and think that even more time should be given to broadening the outlook of the medical student. One suggestion is that at least a year between school and university should be spent in a job; this has a crude parallel in the military service required in Continental countries, and would hardly be acceptable to most students. Another plan would be to imitate the American method, in which a general university degree is taken before starting medicine; again the lengthening of the time as a student would be very irksome to most.

Technical Training

After completion of the introductory course the technical training of the doctor begins. Many criticisms are made of the way in which anatomy and physiology are taught, particularly as the mass of detail to be learnt is very burdensome; but, nevertheless, they are not always justified, for the future doctor and surgeon has to have the details of human anatomy at his finger-tips. The important question is to ask whether this essential knowledge is taught in the best way. The answer is definitely in the negative. In the first place, the two main subjects, anatomy and physiology, are taught as if they bore no relation whatsoever to each other, with the exception that, by a peculiar English custom, histology lives in the same building as physiology. The geographical separation of the dissecting-rooms has created an apparently insuperable obstacle in the relation of structure to function. A little co-operative discussion could surely solve this problem. Anatomy is traditionally learnt by mnemonics—which means without the co-operation of the intelligence. To some extent students are to blame for this, because there are many progressive anatomists who strive against this degradation of their subject. But the students, in turn, are ruled by the examinations and the unknown quantity of the external examiner, so that progress in an isolated school is very difficult. It has already been mentioned in this connection that comparative anatomy illustrates and makes human anatomy more clear, and with this embryology should be included: both these subjects, which introduce a rationale into anatomy, are very much neglected in present teaching. This is not a plea for pedanticism, but is of real practical importance; for anatomy learnt intelligently can never be completely forgotten as can that learnt by rote, when forgetting one letter of a mnemonic may mean making a complete farce of the facts.

The teaching of physiology is, on the whole, much better, but once again suffers from a tendency to cram certain facts without understanding. In this subject the defect is more important, for, while anatomical detail remains the same for successive generations, physiology is advancing at a tremendous rate. Therefore it is essential for the future doctor, if his medicine is to be based on sound physiology, to learn it in a scientific flexible way with an understanding of past developments that will enable him to keep track of its advances in the future. In the past only Oxford and Cambridge have specifically set out to do this, and they allocated a whole year to take an honours course in animal physiology. It was popular in spite of the extra year it required, which means that its value was appreciated by students as well as teachers. Unfortunately, in the interests of the war, this course has been omitted; but in the future its example should be taken heed of, if not in the formal sense of a year's course, at least in the way that physiology is taught. In addition to the intellectual approach, the course provided excellent technical practice, of which the best was in mammalian physiology, for this is the only chance students get of handling living material before they have to deal with patients on the operating table.

The teaching of structure and function together is an obvious need. Equally essential is the comparison of

the diseased with the normal. While it is necessary to appreciate that the student cannot do every subject at once, yet it must be remembered that the pre-clinical subjects are taught for use in clinical medicine, so that the introduction of clinical material early in the course illustrates and gives direction to the learning of anatomy and physiology. Study of the nervous system is the outstanding example in which function and anatomy need to be taught together and then directly applied to the neurological case. Instead of this, each part is taught quite independently, in different places, at different periods, with a great amout of repetition which is wearisome and a waste of time.

Clinical Teaching

In clinical teaching the most frequent criticisms are directed against rather different objects. This is because the whole environment changes from an academic to a professional one. The student is told that the objects of his studies are, first, diagnosis; second, diagnosis; and third, again diagnosis! But the student, while never denying its importance, wonders if this is quite enough. Has he really done all that he can if he listens to a tuberculous lung for six months and then, having diagnosed a healing condition, sends the patient back to the slums he came from? Is it really sufficient to study ten cases of children with rheumatic heart disease without observing that they all come from a district with notoriously bad damp housing? No, it is not enough; and the fact that students in conference bring such criticism up again and again shows that they feel frustrated by the present scope of their teaching. The teaching of Preventive Medicine is a widespread and urgent demand which is neglected almost everywhere. Public health lectures, as given at present, deal with the legal aspects of sanitation, and no more.

The great majority of students are going to be general practitioners, forming the vanguard of any advance to improved health for the community the profession is going to make. On them will rest the responsibility of diagnosing disease early. Yet the material they are taught with is still almost entirely "interesting" cases of rare diseases or with advanced physical signs. This has some justification, for the specialist naturally collects cases in his own specialty, and the loudest murmur is the one for the beginner to listen to. On the other hand, the senior student who has learnt to recognise physical signs can apply his knowledge in clinics, which is the nearest thing to general practice that hospitals provide. Out-patient clinics are fairly good for this purpose if they are not overcrowded, but municipal clinics that some London students go to are better, and the dispensary system in Scotland probably best of all. Another major problem in general practice is the maladjusted, possibly mildly neurotic, patient. A field in which a great deal of good can be done, it is almost entirely neglected by present-day medical education. Psychology consists of a few lectures in the major psychoses, illustrated by the most amusing inmates that the mental hospital can produce. This is a most important omission that can and should be rectified. Also in general practice in industrial centres diseases due to working conditions and industrial processes are constantly being met, yet training in recognising them is confined to possibly two lectures in a public health course. In all these ways could medical education be more closely related to the needs of the doctor after qualifying.

The manner in which teaching is carried out falls short of the ideal. Units tend to be much too large for the best results, as, particularly in the wards, the information does not reach many of the listeners, and there is no opportunity at all of asking questions or taking part in discussion. Lectures are often compulsory, in which case the student is denied even the simple criticism of stopping away, and the lectures may become slovenly as a result. Reading from textbooks has been redundant since the invention of printing. During the last two years, when many schools have been evacuated, it has been found that the formation of seminar groups between teacher and students, with free discussion, has led to the most successful results. At the same time the ability to criticise lecturers has resulted in marked improvements. Thus the formation of staff-student groups to discuss the organisational problems in a school is found to be effective from all points of view, revolutionary though it may seem. The other alternative suggestion is that the staff of a medical school should have had a pedagogical training, or at least be chosen for teaching ability rather than for research. Many feel, however, that this would kill any scientific life in the teaching through replacing scientists by orators, for if the research worker is good he will have such a clear idea of his subject that he cannot talk badly about it. The way forward shown by helpful mutual criticism between teachers and taught seems to be by far the most promising.

The provision of smaller teaching units also enables the student to get far more practical experience of the various techniques, such as lumbar puncture, intravenous infusions, and so on, that he will need to be able to do as a doctor. Opportunity for this varies greatly in various medical schools, and it cannot be doubted that the complete divorcement of the student from practical work is very bad. On the other hand, there is often required a tremendous amount of attendance at operations which in fact can demonstrate nothing to those more than a yard from the operative site. Perhaps most important of all is training in casualty work, for minor surgery plays a large part in a practising doctor's life. The aerial warfare of to-day makes it doubly important; in fact, the teaching of this subject has been greatly extended since the beginning of the war, but there is doubtless still room for improvement in some places.

Conclusion

A great many of the points mentioned can be easily changed by local adjustment, and usually the staff are very willing to accept suggestions for improvement. Broadly, however, the aims of medical teaching can only be altered, so that they fulfil the needs of the doctor and enable him to serve the community to the best of his ability, on a national scale. The British Medical Students' Association is going to present, by invitation, a memorandum to the Planning Commission set up by the B.M.A., and by this means it is hoped that the necessary changes will be effected.

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PLEA FOR REINSTATEMENT OF MILK RECORDING GRANTS

An urgent request that the Government grant to milk-recording societies should be reinstated was unanimously approved by the Council of Lancashire Milk Recording Society last week (states *The Farmers' Weekly* of September 26th). Mr. George Bingham, Chairman of the Management Committee, said that the Ministry of Agriculture had considered it expedient to reinstate the grants to bulls and the grants to heavy-horse-breeding societies. In view of the great importance attached to the milk supply by the Ministry of Food, he thought they were justified in asking the Central Council to approach the Ministry on behalf of the milk-recording movement.

Mr. Harold Jackson (President of the Lancashire Society and also Chairman of the Central Council) said bull grants were reinstated at the request of the Central Council, who, on three occasions, had also approached the Ministry with a view to the renewal of the milk-recording grants.

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At a meeting of the Farmers' Club to be held at the Royal Empire Society on Monday, November 10th, at 3 p.m., Mr. Thomas Peacock will read a paper entitled "Farming's Great War Effort,"

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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CONTROL OF ANIMAL DISEASE: THE SCHEME OF THE SURVEY COMMITTEE OF THE N.V.M.A.

To the Editor of the Veterinary Record

Sir,—May I, though a newcomer to the profession but, as such, acutely interested in the prospects for its future, venture to comment upon Professor McCunn's reply to Mr. Crosfield's important letter.

Few of us who have grown up "between the wars" will share Professor McCunn's complacency in regard to the economic and social organisation of this country during that period. The root cause of these two desperate conflicts with 25 years lies not merely in the spirit of German Prussianism, but in the fact that an economic system, which worked admirably at its inception and for a considerable period, has, in the course of its development, give rise to the very forces which are now, inevitably, bringing about its own destruction. Although Professor McCunn and others may choose to close their eyes to the facts, the extremes of poverty and plenty do exist, together with the consequent slums and degradation.

Our hope for the future must lie in the realisation that that system has finally crumbled and that, after the war, any attempt to return to the pre-war situation must inevitably lead to an even greater disaster within the next decade or so. If we are conscious of this and that the days of unlimited private enterprise and free competition are over, we can then, and only then, attempt to plan for the future.

There is little doubt that the next form of economic order will be founded upon a basis of co-operative ownership—call it socialism, nationalisation or what you will—but I do not believe that it will be on any continental model but that it will be elaborated out of our democratic English tradition.

If we accept this, and the number who do so steadily increases, we can expect that nationalisation of all public utilities is inevitable and that agriculture would soon be included in such a scheme.

It is with this prospect in view that we must plan for the future of the profession and it should be borne in mind that, in a true democracy, if all the members are really working for the common good, the dangers of bureaucratic control are considerably lessened.

The Survey Committee's Scheme, however, represents a short-term policy for the profession and, as such, must be judged in accordance with one standard only, *i.e.*, through it, will the profession be playing its maximum part towards winning the war. This being so, the profession should avoid any promises either to agriculture or to the community as a whole, which it is not absolutely certain it can fulfil. A less ambitious scheme which did not seek to solve, with inadequate equipment, all the major problems at once would surely be a safer project.

Yours faithfully,
George A. Willis.

Liverpool.
October 20th, 1941.

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To the Editor of the Veterinary Record

Sir,—It is most encouraging to find that the Editorial Committee of *The Veterinary Record* do not consider Mr. Crosfield's recent letter to be "euphemistic"* and that his idea of the future is not thought to be too hopelessly idealistic.

The N.V.M.A. Survey Committee is doing its best to convince the members of our profession that they owe a debt to the community which fosters them and that they should look forward to a state of affairs where the practising veterinary surgeon plays his part as a public servant. This debt will never be paid whilst so many of our people look back with longing eyes to the good old days, when they used to jingle round their practices seated in smart gigs with high-stepping ponies and with their firing irons, horse balls and cleansing drenches, etc., in a box behind them. Of course, they envisage themselves now in comfortable cars but I suspect that their state of mind is still the same.

I am one of those who have become enmeshed in the evils of the hated bureaucracy, but I do not think I have yet lost my individualism or stand in any danger of doing so; in fact, the more I see of it, the more strongly do I become convinced that it is the individual himself who creates the evils in a bureaucracy.

Dr. McCunn says "emulation is the spur to success." So it is, but surely the satisfaction of having done a good job of work, calling for skill and knowledge, should be sufficient reward for our labour, coming as it does from a profession which should exist primarily to alleviate the suffering of animals, which indirectly affects the health and well-being of the community at large?

Yours faithfully,
J. D. Blaxland.

Elvynne,
Garfield Avenue,
Dorchester.

October 21st, 1941.

[* We regret, however, with apologies to Dr. McCunn, that the word "euphemistic" was erroneously used in reproduction in place of his adjective "euhemeristic." For the benefit of our readers we would add that the O.D. defines "euhemerism" as the method of interpretation which regards myths as traditional accounts of real incidents in human history.—*Editor.*]

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To the Editor of the Veterinary Record

Sir,—It is not without trepidation that I join issue with a dialectician of the skill and experience of Dr. McCunn, whom I had always thought to be among the progressives, but whose spiritual home would now appear to be in the last ditch. Ridicule has long been his favourite weapon (and why not?—was not James II "whistled off his throne"?); but though my pen itches (*sic*) to give a Roland for his Oliver, I feel the present issues are too important for mere slapstick treatment.

Really, Dr. McCunn, if the present schemes of control of labour, of trade, of prices, the compulsion to do this, that and the other, do not constitute a revolution towards Socialism, what are they? They are at any rate of the essence of Nazi practice (I write from personal knowledge and experience). The fact that you *admit* not having noticed these things surely lends point to my first contention in my previous letter—that few correspondents appear aware of the general trend of political and economic thought. Do you seriously imagine, Dr. McCunn, that the Left Wing is going, after the war, to give up that part of its platform which has already been implemented? I do not like the prospect any more than you do; I do not want to be regimented. I've never in my life carried out an instruction with which I did not agree (frequently with disastrous results!) and I'm certainly not going to start now. So, Dr. McCunn, I am not going to give up my individualism without a fight. But that is not to say that I am blind to what is going on around me.

Towards the end of your communication you postulate a number of pertinent questions; my letter has been of value if only to make you ask yourself, and through the columns of *The Veterinary Record*, the rest of the profession, these questions. You see so many trees so

clearly, Dr. McCunn, that I marvel more and more at your inability to see that they make a wood!

Yours faithfully,

Paul Crosfield.

Chipping Norton,
Oxon.
October 10th, 1941.

[Much as we admire the Quentin Reynolds technique, we would remind our correspondents that letters should be addressed to the Editor and not to members of the profession.—*Editor.*]

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SOLVITUR AMBULANDO

To the Editor of the Veterinary Record

Sir,—The above aphorism, which was the title of your Editorial of October 11th, was well chosen. Its retention as our prerogative is due to a kindly providence which placed a narrow strip of water between our small island and the Continent of Europe, to which geography has given the name "The English Channel."

How stupid it is to attempt to insinuate that the prosperity of the veterinary profession is not inseparably associated with a corresponding one in agriculture. It is, however, questionable if the present revival in agriculture will prove other than one engendered by the exigencies of war, unless the public is taught that it is our basic industry, and one without which very few others could for long exist. In the course of the present century, through gross neglect in times of peace by politicians whose system of government has long been out-of-date, we as islanders have come well-nigh unto disaster no less than twice. Is Fate to be tempted for a third possible time?

The critic who regards Mr. Paul Crosfield's letter as "euhemeristic," if amusing, is not convincing in the arguments which he adopts. He offers us nothing, beyond an invitation to stay as we are. After giving praise to the reputed Utopian conditions which prevailed in the Victorian epoch, he has apparently overlooked the historical fact that, during it, death duties were introduced, and these in the course of time have resulted in the gradual extinction of those benevolent landlords whom, he informs us, were the very backbone of agriculture. Judging by results, their successors have with very rare exceptions regarded agriculture as a source from which to extract revenue—certainly not to invest any capital in it. If agriculture is to survive, State control, with, if necessary, State ownership of the land, appears to be the only logical solution.

The facetious nonsense that State control and with it, State employment, is accompanied by a loss of individuality, was preached to the medical profession prior to the passing of the National Health Insurance Act, yet time has shown that, far from a loss of individuality, it has assured the survival of not a few practices.

The veterinary profession should ask itself if it would be wise in declining, in the event of such employment being offered to it in the process of post-war reconstruction. Monopolies have got to be broken, but with a wide margin of freedom in which individual initiative can function.

I would ask my profession if it considers that what individuality it may at present possess, extends beyond a personal one, if it impresses the State—as at present constituted—and if it serves the best interests of all. It would be illuminating to know, if such is the case, why every offer to participate with other services has been turned down: and requests to be placed on the same footing as others have been declined.

It is further not very dignified for the possessors of such an individuality, when they desire garments essential to their professional work, that if these are to be obtained coupon-free, a personal request is necessary for a voucher from the County War Agricultural Executive Committee of the locality in which this individuality is assumed to flourish.

If a continuance of it means that one has in return to put up with all this, then surely to become an automaton as a component part of a State to ensure its automatism, is to be preferred, and not refused—if ever it is offered?

Yours faithfully,

"Rothiemurchus," J. F. D. Tutt.
St. Cross,
Winchester.
October 22nd, 1941.

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PREGNANCY TOXAEMIA IN SHEEP

To the Editor of the Veterinary Record

Sir,—I have noted with interest that it is reported in the *Jen-Sal Journal* that Dr. E. B. Orme, Montrose, Colorado, was recently called to treat 57 ewes suffering from pregnancy disease in a flock of approximately 1,200 animals, 100 of which had already died. A number of the sick ewes were treated with vitamin B_1 solution; Dr. Orme reported that good results were obtained with this therapy.

This publication has led me to put on record the fact that I have been working independently on similar lines.

From a study of this condition it has seemed to me that a deficiency of vitamin B_1 could possibly be responsible for the complaint, as this vitamin controls to a large extent the carbohydrate metabolism. It is no doubt a breakdown of this which is responsible for the fatty liver encountered on *post-mortem* examination.

It is said that ruminants are capable of synthesising this vitamin in the rumen, and this may be sufficient for single pregnancies, but insufficient where two or more lambs are carried.

This spring a flock of about 300 breeding ewes was fed adequate quantities of vitamin B_1 in their trough food three weeks prior to lambing, and, despite there being a heavy percentage of twin lambs, no losses were experienced in either ewes or lambs. It is hoped to increase the scope of this experiment next year by embracing more flocks and commencing the vitamin supplement feeding at least four weeks before lambing.

I am indebted to the Research Department of Messrs. Boots, the chemists, who kindly collaborated with me in this work.

Yours faithfully,

Veterinary Establishment, H. S. Cockburn.
Eastwood,
Notts.
October 21st, 1941.

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THE LATE JOHN LANG

To the Editor of the Veterinary Record

Sir,—I shall be glad to have space in the *Record* to record our grateful thanks for the many letters of sympathy received from friends in the profession. We accept them, too, as tributes to the memory of one of our many thousands of brave boys.

His officer described him as "a real commando soldier": nothing finer can be said.

Yours faithfully,

Brigg. W. W. Lang.
October 20th, 1941.

Advertiser's Announcement

"Caniseran"

Messrs. Bayer Products Ltd., Africa House, Kingsway, W.C.2, announce that they have introduced, under the name "Caniseran," a British-made serum for combating the *secondary infections* in canine distemper. The availability of the serum is three years. Full particulars will be furnished on request; in the meantime, it may be noted that *until November 3rd*, 1941, "Caniseran" is exempt from Purchase Tax.